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ABSTRACT

The U.S. Department of Education makes a considerable investment in math and science education each year. This document discusses the Eisenhower Mathematics and Science Education Program, the largest of the Department of Education's programs dedicated to math and science. This program includes: (1) The National Program (funding nearly $16 million in FY 1993) and (2) the State Grant Program (providing $250 million a year to states for professional development to improve teachers' skills and the quality of teaching in math and science in elementary and secondary schools.) The evaluation and monitoring of the Eisenhower national and state grant programs are discussed, including development of performance indicators, annual state performance reports, and indicators for systemic reform. Next steps include an in-depth evaluation of what the Eisenhower Program is contributing to improvements in teachers' skills and the quality of classroom instruction. (MKR)

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Evaluating and Monitoring
The Eisenhower Mathematics and Science Education Program

Presentation at the
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by Nancy Loy

Investment in math and science education

The U.S. Department of Education (ED) makes a considerable investment in math and science education every year. As shown in Table 1 below, in FY 1993, the Department spent $341 million on core programs dedicated specifically to math and science education. Ninety-six percent of this funding supported education at the elementary and secondary levels, including professional development for classroom teachers. This was the largest investment of any federal agency in math and science education at the elementary and secondary level, according to the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET), precursor to the National Science and Technology Council (Expert Panel for the Review of Federal Education Programs in Science, Mathematics, Engineering, and Technology, 1993, Table 1-6, p. 9).

These figures actually understate the investment in math and science education, for they count only core math and science education programs. In addition, the U.S. Department of Education supports other education programs that include math and science, but are not dedicated solely to math and science. Most notable among these is the Chapter 1 Program for Educationally Disadvantaged Children. ED's Chapter 1 Program provided instruction in mathematics to an estimated three million disadvantaged children in FY 1993 (Sinclair and Gutmann, 1994 forthcoming).

Eisenhower Mathematics and Science Education National Program

The largest among ED's programs dedicated to math and science is the Eisenhower Mathematics and Science Education Program. Eisenhower includes: (1) the National Program and (2) the State Grant Program. The Eisenhower National Program provides discretionary grants to support projects of national significance to improve the quality of teaching in mathematics and science, such as grants to help states develop new curriculum frameworks. Funding totalled nearly $16 million in FY 1993.

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Table 1

Core Science, Mathematics, Engineering and Technology Education (SMET) Programs FY 1993 Budget Totals

FEDERAL AGENCY	TOTAL BUDGET FOR SMET EDUCATION (millions)	ELEMENTARY AND SECONDARY LEVELS (millions)
NSF	$537.9	$309.8
DEFENSE	526.7	24.8
HHS	464.1	26.9
ED	**340.9**	**328.3**
ENERGY	102.1	27.4
INTERIOR	86.0	23.0
NASA	79.8	20.5
AGRICULTURE	24.4	1.2
SMITHSONIAN	10.1	0.7
EPA	9.0	7.1
COMMERCE	5.2	0.0
Total	$2,186.2	$769.5

Adapted from: Expert Panel for the Review of Federal Education Programs in Science, Mathematics, Engineering, and Technology (1993). *The Federal Investment in Science, Mathematics, Engineering, and Technology Education: Where Now? What Next? Sourcebook.* Arlington, VA: National Science Foundation; Table 1-6, p. 9.

Also under the Eisenhower National Program is the Regional Consortiums Program. The 10 Regional Consortia coordinate with the Eisenhower National Clearinghouse to disseminate exemplary instructional materials for math and science. The Consortia also provide technical assistance to help states implement new curricula, teaching methods, materials, and assessment tools in elementary and secondary schools. Funding to the Consortia was separate from Eisenhower National Program appropriations and totalled nearly $14 million in FY 1993.

Currently, the U.S. Department of Education is evaluating both the Eisenhower National Program State Curriculum Frameworks Projects and the Regional Consortiums Program through a contract with SRI International and its subcontractors, Policy Studies Associates, Inc., and the Council of Chief State School Officers (CCSSO). In the evaluation of the State Curriculum Frameworks, we are examining the process through which states are developing their frameworks, the quality of the frameworks within the context of what the different states are trying to accomplish, alignment of the state frameworks with national standards, equity issues, and implementation through state policies, and through alignment of teacher preparation, teacher certification, and professional development. In the evaluation of the Regional Consortiums Program, we are focusing on the technical assistance they provide, their dissemination of exemplary materials, other Consortia services, and the niche the Consortia have shaped within the context of varying needs among the different regions.

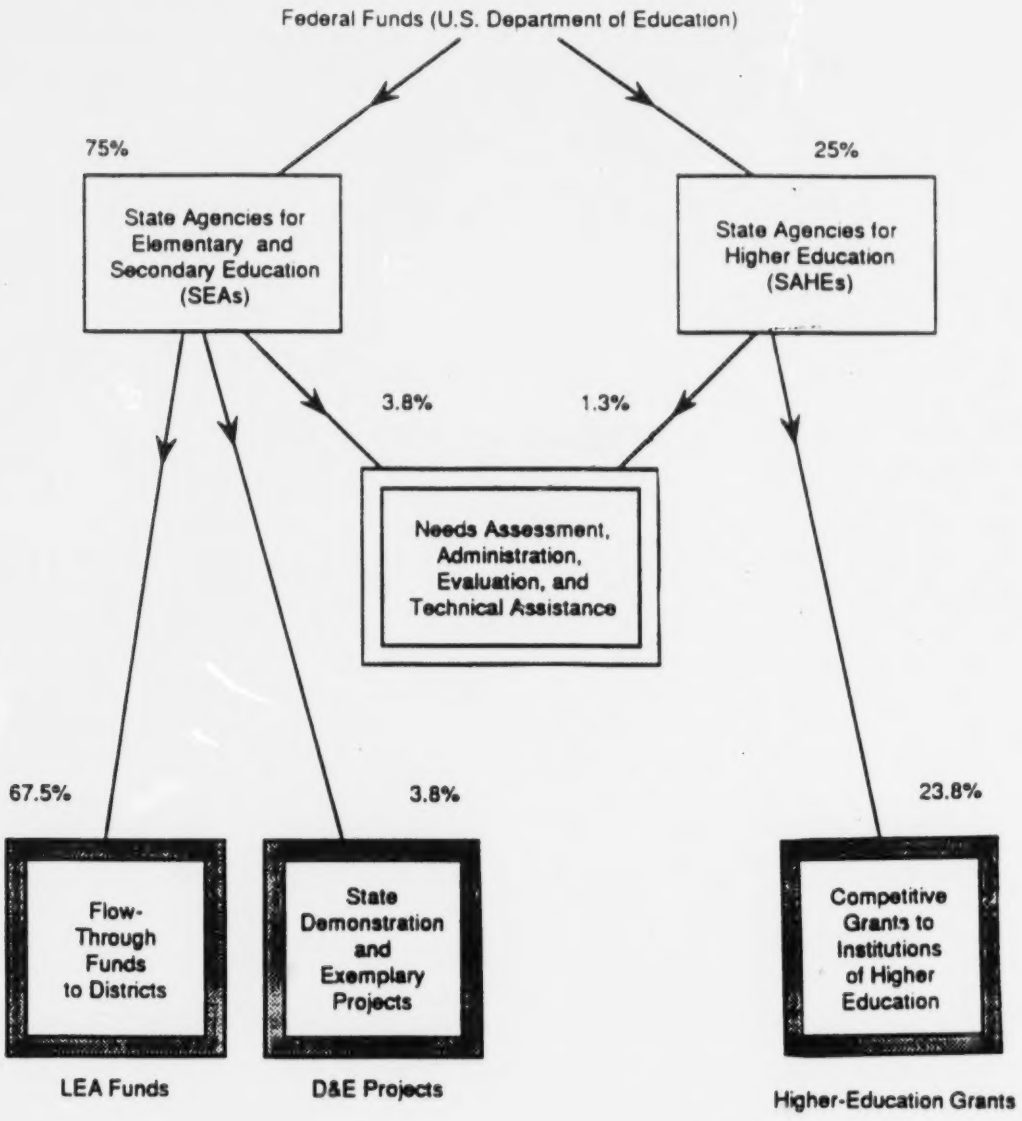
In both Eisenhower evaluations, we are examining their relationship with other state and federal educational reform efforts, including Goals 2000, the Eisenhower State Grant Program, and the National Science Foundation's (NSF's) Statewide Systemic Initiatives (SSI). Through both evaluations, we are seeking to learn what is working, what is not, and why, and to what extent these Eisenhower programs are contributing to systemic reform and improvements in math and science education. To accomplish these objectives, the U.S. Department of Education is coordinating its evaluations with NSF's SSI evaluation and with CCSSO's study of state curriculum frameworks.

Eisenhower Mathematics and Science State Grant Program

The largest part of the Eisenhower Mathematics and Science Program is the State Grant Program. The Eisenhower State Grant Program provides $250 million a year to states for professional development activities to improve teachers' skills and the quality of teaching in math and science in elementary and secondary schools. The program also emphasizes improving instruction for underserved and underrepresented populations, including females, racial and ethnic minorities, economically disadvantaged populations, and students with disabilities.

Figure 1

Distribution of Eisenhower State Grant Program Funds



Updated from Knapp, M. S., et al. (1991). *The Eisenhower Mathematics and Science Education Program: An Enabling Resource for Reform.* Menlo Park, CA: SRI International, Figure 1, p. 4.

As shown in Figure 1 below, at least two-thirds of the Eisenhower State Grant Program funding flows to school districts through formula grants, based on local demographics (updated from Knapp et al., 1991, Figure 1, page 4). School districts use the Eisenhower State formula grants primarily to provide in-service professional development for classroom teachers. Colleges and universities use one-fourth of the Eisenhower State Grant funding for in-service professional development and some pre-service teacher preparation. State Education Agencies use the remainder for demonstration projects, technical assistance, and program administration.

SRI International completed an evaluation of the Eisenhower State Grant Program for the U.S. Department of Education in 1990, examining the scope of the program and the nature of Eisenhower activities. The evaluation found that the program provided funds to virtually all school districts in the United States, and that an estimated one-third of all math and science teachers, including elementary school teachers, took part in activities funded by the program. Yet, formula grants to school districts paid for an average of only six hours of training per participant (Knapp et al., 1991, p. xiv).[1]

The evaluation found that the projects funded by the formula grants did provide the opportunity for large numbers of teachers to become aware of reform ideas, make connections with colleagues, and expand their interest in math and science teaching. However, the quality of the professional development provided through the formula grants varied considerably. Although some districts used Eisenhower funding for well-designed staff development with reportedly clear impact on teachers' classroom practices, other districts used it for ad hoc training that was not linked to a comprehensive strategy. In contrast, Eisenhower discretionary grants to colleges and universities averaged 60 hours per participant and provided more intensive professional development activities with greater impact than the formula grants (Knapp et al., 1991, pp. xiv-v).

Other evaluation activities

In addition to evaluating its own programs, the U.S. Department of Education also coordinates with other federal agencies on evaluation as an active member of the Dissemination and Evaluation Working Group of the National Science and Technology Council (NSTC), formerly the Federal Coordinating Council on Science, Engineering, and Technology (FCCSET). For example, we have worked with FCCSET's expert panel, which reviewed federal programs in math, science, and technology education, as well as evaluations of these programs, and made recommendations to strengthen the federal investment in these areas. The Department has also provided input to the National Research Council (NRC) for its work developing indicators for the National Aeronautics and Space Administration's

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[1]The study was conducted during school year 1988-89. Eisenhower State Grant Program funding for FY 1989 was $128 million, about half the level of funding in FY 1994.

(NASA's) education programs. Currently, through the NSTC's Dissemination and Evaluation Working Group, we are collaborating on evaluation plans for agencies' math and science education programs, and on plans for a joint evaluation of selected teacher enhancement programs across federal agencies.

Monitoring the Eisenhower State Grant Program

The U.S. Department of Education conducts program evaluations to provide an in-depth look at its programs. Yet, evaluations are just one part of the picture. The Department also conducts on-going monitoring to maintain up-to-date information on what is happening in its programs, to track changes, and to provide red flags to alert us to problems that we need to address. To monitor the Eisenhower State Grant Program, the Department conducts site visits to selected states. These site visits, plus follow-up work, give us fairly in-depth information on what the Eisenhower projects are doing and how Eisenhower funds are spent. However, we are able to conduct site visits to only 5-10 states each year because of the time investment and travel funds they require.

Complementing the site visits, we also monitor the Eisenhower State Grant Program through annual state performance reports, which all states send to the Department every year. In addition to providing information about each individual state, these performance reports give us a picture of the program as a whole, and enable us to make cross-state comparisons.

Developing performance indicators for the Eisenhower State Grant Program

What changes is the Department making in monitoring the Eisenhower State Grant Program? We are taking a more comprehensive look at the program, developing a set of performance indicators, and making improvements in the annual state performance report forms.

Although the Department has not finished developing a set of performance indicators for the Eisenhower State Grant Program, we have made progress. The National Academy of Public Administration (NAPA), a non-profit organization chartered by Congress to improve the effectiveness of government, is working with the Department to help us develop sets of performance indicators for a number of our programs, for program management, program improvement, accountability, and budget and policy decisions.

NAPA proposed a framework of four categories of performance indicators: input indicators, process indicators, outcome indicators, and context indicators (summarized from Wye, C., et al., 1993):

- Input indicators to describe the size and scope of the program: funding, staffing, and other resources for program management.

- Process indicators to describe services, activities, and participants funded through program expenditures.

- Outcome indicators to assess progress toward goals in terms of teachers' skills and the quality of instruction.[2]

- Context indicators to describe the environment in which the program operates, such as curriculum development and trends in student achievement.[3]

Based on the framework that NAPA proposed, the Department is currently developing a set of indicators. The Department will draw data together for the indicators from a variety of sources of information, including the annual state performance reports, to obtain a more comprehensive, integrated picture of the program and the context within which it operates. NAPA focused on the annual state performance reports as a realistic source of information for some of the input indicators, such as Eisenhower funding, and for some of the process indicators, such as Eisenhower-funded services, activities, and participation (Wye, C., et al., 1993).

Eisenhower State Grant Program annual state performance reports

States have submitted performance reports since the Eisenhower State Grant Program started. When the program began in school year 1985-86, as Title II of the 1984 Education for Economic Security Act, the Department asked states to report annually on how they spent their Title II money and whether they met the objectives they had set for the program. The usefulness of the information reported by states was limited, because the information was narrative and varied tremendously from state to state. Four years later, when the program started operating as the Eisenhower State Grant Program under the 1988 Elementary and Secondary Education Act, the Department developed more detailed questionnaires for states to submit comparable data, beginning with school year 1989-90.

Recently, the Department has made improvements in the questionnaire we provide for the annual state performance reports, with assistance from Westat, Inc. In addition to considering the performance reports within the broader framework that NAPA suggested, we have made

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[2]NAPA noted that the Eisenhower legislation specifically defined the objectives of the program in terms of teachers' skills and quality of instruction, not in terms of student outcomes (Wye, C., et al, 1993).

[3]Many of the kinds of indicators identified by Richard J. Murnane and Senta A. Raizen (1988) also would be considered context indicators.

two other major improvements, by focusing on state-level issues and directly addressing indicators for systemic educational reform.

Before the Department can use any questionnaire to collect data, including the annual state performance report form, it must be reviewed and approved by the Office of Management and Budget (OMB). OMB has been very much involved in our efforts to improve the performance report form. One recommendation that both OMB and NAPA made was that we be sure to ask states for information that they can provide. This point may sound simple. However, since the state performance reports are the only annual source of information the Department receives on the program nationwide, it is tempting to try to get all the information we need from this single source. Yet, as OMB and NAPA reminded us, an annual report from states is not a realistic source for detailed information on local Eisenhower activities, much less would it be an appropriate source for detailed information on individual participants. For that kind of information, we are now considering a combination of surveys of samples of school districts, surveys of participants in Eisenhower activities, and in-depth evaluation.

In addition to eliminating some questions from the annual state performance report that had asked for detailed information about local Eisenhower activities and participants, we have started addressing some issues concerning the role of the State Education Agency that we had not addressed earlier, such as questions about the placement and staffing of the Eisenhower office within the State Education Agency (SEA). We also are looking at the role of the state in providing direction and guidance to school districts. As one indicator, we are asking about the extent to which SEAs decide the priorities for local school districts to follow in the Eisenhower Program or allow local flexibility.

Directly addressing indicators for systemic reform

In addition to asking more appropriate state-level questions on the annual state performance report, the Department also is directly addressing indicators for systemic educational reform. There is growing recognition by the education community of the importance of systemic reform to improve teaching and learning. Instead of focusing on isolated professional development activities, the Department is encouraging states to use Eisenhower funds as part of a broader plan to support systemic educational reform. For example, if a state has developed a new curriculum framework for math, the state could use Eisenhower funds for professional development activities to familiarize teachers with the new curriculum framework and to provide training in related instructional practices.

The new annual state performance report form reflects this shift in focus and asks specifically about activities that would support systemic reform, such as alignment of Eisenhower priorities with other reform efforts, such as curriculum framework development and student assessment, and collaboration with other programs, such as the Eisenhower Regional Consortia. ED's

Regional Educational Laboratories, NSF's SSI and Teacher Collaboratives, NASA's programs, U.S. Department of Energy's laboratories, and other federal and state programs.

Next steps

At the U.S. Department of Education, we have made progress, but we still have a long way to go in monitoring and evaluating the Eisenhower Program. We have begun to develop a set of performance indicators and will draw together information from a variety of sources to formulate a comprehensive picture of the program across states and over time. We have revised the annual state performance report within this broader framework. In addition, we will be conducting in-depth evaluations for a better understanding of what is working, what is not working, and why, and to what extent the Eisenhower Program is contributing to improvements in teachers' skills and the quality of classroom instruction.